#### Before the

# Federal Communications Commission Washington, D.C. 20554

In the Matter of	)	
	)	
Reallocation and Service Rules for the 698-746	)	GN Docket No. 01-74
MHz Spectrum Band (Television Channels 52-59)	)	

#### COMMENTS OF SHARED SPECTRUM COMPANY

### 1. Introduction

Shared Spectrum Company, pursuant to Federal Communications Commission Rule Section 1.415, hereby respectfully submits these comments in response to the *Notice of Proposed Rulemaking In the Matter of Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59*), (GN Docket No. 01-74), adopted by the FCC on March 16, 2001, and released for public comment on March 28, 2001 ("NPRM"). Shared Spectrum is a newly formed company developing broadband wireless equipment optimized for secondary spectrum markets applications. Shared Spectrum's equipment would allow efficient use of the "spectrum holes" between the incumbent broadcasters and would minimize the need for clearing.

Shared Spectrum Company agrees overall with the Commission's plans for the reallocation of Television Channels 52-59. In Paragraph 20 of its NPRM, the Commission observes that "[t]he significant degree of incumbency will pose considerable challenges to the provision of viable new commercial services prior to the end of the transition" and cites the maps ostensibly showing the Grade B contours of television channels 52 to 59. In light of the incumbency challenge, the Commission NPRM raises a question about the viability of an auction. Shared Spectrum is convinced that the auction is quite viable. First of all the Grade B contours on maps upon which the question was predicated are significantly enlarged beyond the actual Grade B contours and the non-interference areas are thus much larger than shown in those maps. Secondly, the process of sharing spectrum in a context of changing station deployment,

as new stations come on and old stations cease operations, can be greatly facilitated by the use of Shared Spectrum Company's technology and the effective communications capacity of the shared spectrum substantially increased.

Our comments address several technical issues that will facilitate secondary spectrum usage and will greatly increase the value of the spectrum to service providers. Shared Spectrum suggests that: (1) the Commission use a field strength limit within the TV protected zones that is based on measurements and not based on predicted line-of-sight propagation losses. This will greatly increase the amount of available spectrum. (2) the Commission provide a precise geographical description of each TV protection zone; and (3) the Commission provide a consolidated engineering database of the TV transmitters to enable interference calculations outside of the protected zones.

### 2. Use of Actual Field Strength Criteria Will Greatly Increase the Amount of Available Spectrum Without Displacing Incumbent Broadcasters

A significant fraction of the 698 MHz-746 MHz band spatially in between the incumbent broadcasters is available for secondary use if the FCC adopts the proposed protection zone field strength rules and these are based on actual values, not line-of-sight based propagation models. Shared Spectrum has estimated the Grade-B protection zones using the FCC propagation model "Tvfmfs" as shown in Figure 1 for channel 55. It is our understanding of the proposed rules that outside of the Grade-B area, the incumbent TV station does not have interference protection and that these areas should be considered for interference calculcations. Thus, our calculations show that a large fraction of area, even along the east coast is available for secondary spectrum sharing without clearing the incumbent TV stations.

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<sup>&</sup>lt;sup>1</sup> "Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)", Paragraph 30.

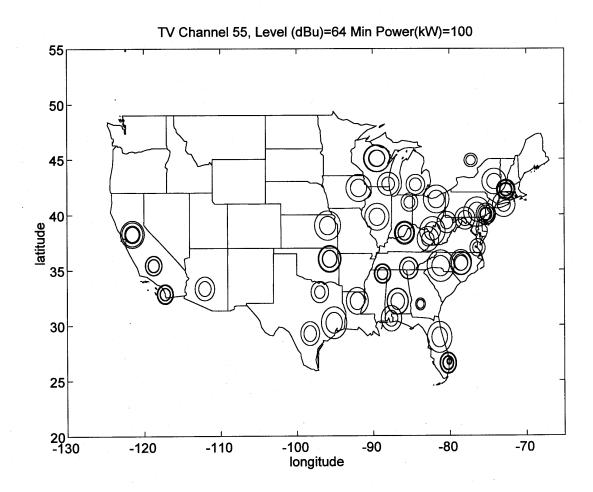


Figure 1 Protection zones using Grade B contours predicted by computer code "Tvfmfs" (inner ring P(50,50), outer ring P(50,10)).

However, the figures in the FCC's NPR document give an incorrect impression of the amount of space between the incumbent's protection zones.<sup>2</sup> An example is in Figure 2 where the FCC's Channel 55 protection zones are shown. The figure shows that the co-channel protection zones overlap, which we believe is incorrect if these are the Grade-B zones. We believe that these protection zones are the Grade-B distances plus a large distance to account for potential new services.

<sup>&</sup>lt;sup>2</sup> "Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)", Appendix B.

## Channel 55: DTV & NTSC Incumbents Adjacent & Co-Channel Protection Zones

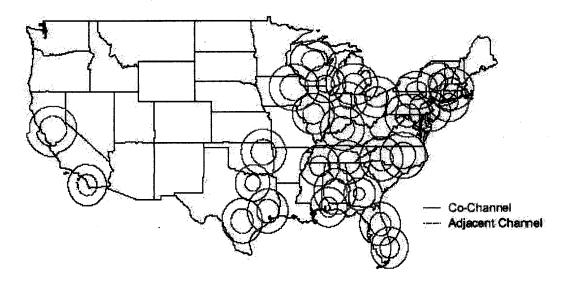


Figure 2 Protection zones from "Reallocation and Service Rules for the 698-746 MHz Spectrum and (Television Channels 52-59), FCC 01-91, Page B-4.

To maximize the amount of spectrum available, our equipment dynamically detects and removes/restricts nodes that have line-of-sight (LOS) signal propagation into the protected zones. Eliminating these paths is key to any system that intends to effectively share the TV spectrum because the separation distance between a cellular system that has LOS paths into the TV protected zones must be very large to avoid interference. The LOS and NLOS distances are estimated using a typical example.

Figure 3 shows the field strength of a TV station (5,000 kW and 200 m antenna height) and a cellular system (1 W TX and dipole antennas on a 30 meter high tower) versus distance from the TV station. The cellular system is located at a range (373 km) where the LOS signal strength is 40 dB below the Grade-B value at the edge of the TV's protection zone. The TV signal strength is based on the "Tvfmfs" model and both the "P(50,50)" and the "P(50,10)" values are shown. We assume that the exclusion zones

are based on the P(50,10) values. The non-line-of-sight (NLOS) field strengths are based on well-known propagation models.<sup>3</sup>

Figure 4 shows a similar case except that the cellular system is located at a range (142 km) where the NLOS signal strength is 40 dB below the Grade-B value at the edge of the TV's protection zone.

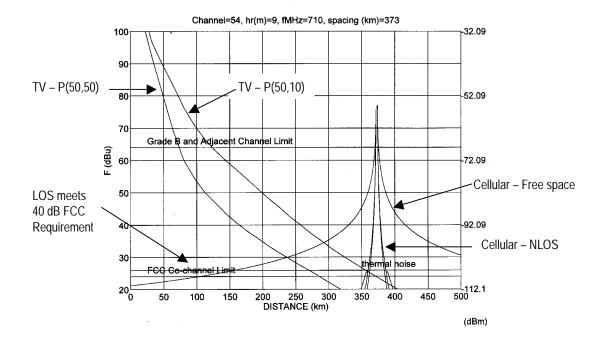


Figure 3 TV signal field strength and cellular system field strength versus distance from a TV station when the cellular system's free space signal meets the FCC 40 dB co-channel requirement.

<sup>&</sup>lt;sup>3</sup> "Mobile Communications Design Fundamentals", Page 65, Lee 1993.

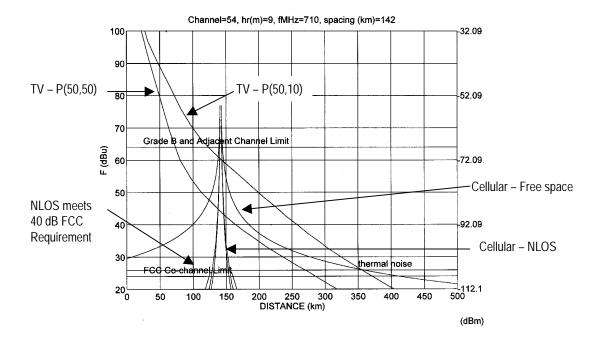


Figure 4 TV signal field strength and cellular system field strength versus distance from a TV station when the cellular system's NLOS signal meets the FCC 40 dB co-channel requirement.

Shared Spectrum has estimated the amount of spectrum available at large number of specific points in the United States using NLOS propagation models to set the cellular system's minimum distance to the TV protection zones. To estimate the importance of each of the FCC's interference rules, the analysis considers the limitations due to the co-channel interference rule and due to both the co-channel and adjacent channel rules. These results are shown in Figure 5 (Georgia/Alabama region), Figure 6 (Virginia/West Virginia region), and Figure 7 (New Jersey/New York region). The results indicate that a significant portion of the 48 MHz of spectrum is available in many areas.

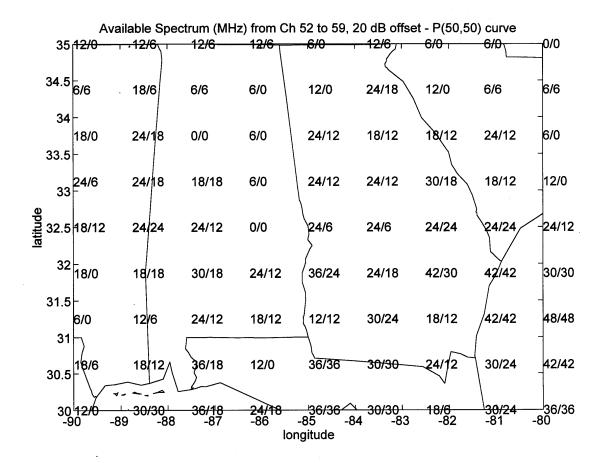


Figure 5 Available spectrum (in MHz) from Channels 52-59 MHz in the Georgia/Alabama region. The first value considers just the co-channel rule. The second value considers both the co-channel and the adjacent channel rule.

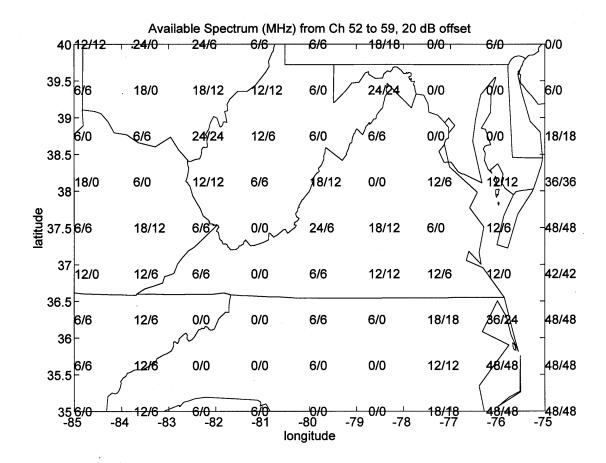


Figure 6 Available spectrum (in MHz) from Channels 52-59 MHz in the Virginia/West Virginia region. The first value considers just the co-channel rule. The second value considers both the co-channel and the adjacent channel rule.

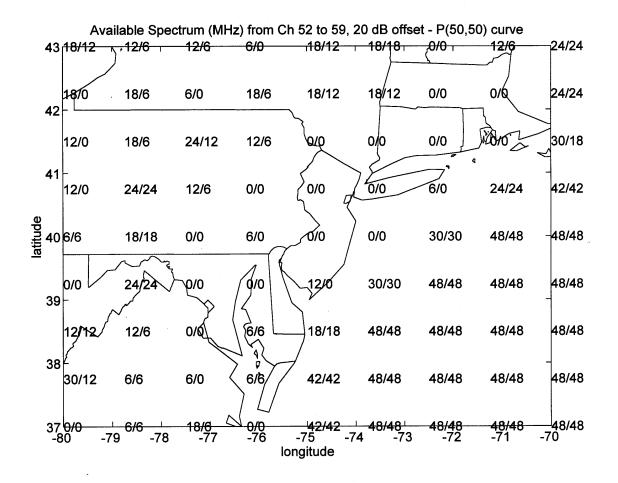


Figure 7 Available spectrum (in MHz) from Channels 52-59 MHz in the New Jersey/New York region. The first value considers just the co-channel rule. The second value considers both the co-channel and the adjacent channel rule.

If the LOS propagation model is used to set the separation of the cellular system relative to the TV protected zone, the amount of spectrum available without removing the incumbent stations is insignificant. Figure 8 shows the amount of spectrum available in the Georgia/Alabama region under these conditions.

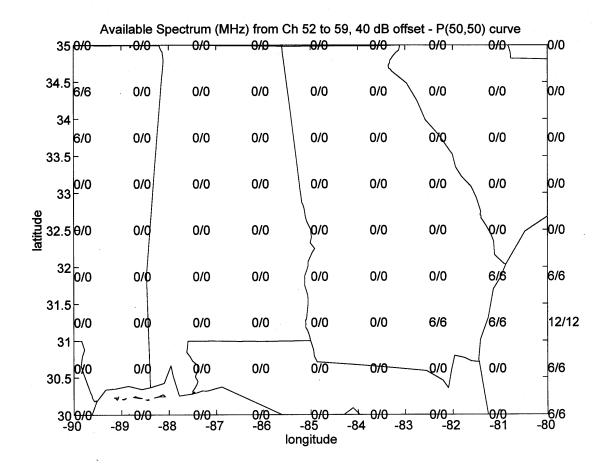


Figure 8 Available spectrum (in MHz) from Channels 52-59 MHz in the Georgia/Alabama region based on LOS propagation to the TV protection zone. The first value considers just the co-channel rule. The second value considers both the co-channel and the adjacent channel rule.

Thus, Shared Spectrum suggests the FCC adopt interference criteria that are based on the actual field strength levels in the TV exclusion zones and not based only on model based transmitter separations. This will provide a significant amount of spectrum for new services without impacting broadcast services and, hence, at the lowest cost to consumers.

### 3. Need for a Precise Geographic Limit of TV Protection Zones

The Commission needs to establish and make available well before the auction the geographic boundaries of each incumbent broadcaster's service area. These

boundaries should include terrain effects to account for areas where shadowing and other effects will tend to change affect the protection zone boundary. This should include LPTV or any other TV services the Commission may decide should be protected. The Shared Spectrum equipment will then adaptively set the secondary system's power levels and frequency assignments to maintain the specified interference levels within the protection zones.

### 4. Need for an FCC Supplied Database of Incumbent Transmitters

The FCC needs to provide an engineering database of all incumbent TV transmitters. This information is critical to initially evaluate the amount of interference caused by the TV stations to potential services outside of the TV protection zones, and thus to determine the economic viability of potential secondary usage systems. Once in operation, secondary systems such as Shared Spectrum's will automatically make these measurements to account for changing station deployments and unusual propagation conditions.

While in principle the FCC's CDBS database system will provide this information, the information is spread over three complex and large database files ("tv\_eng\_data", "application", and "facility"). For a variety of reasons, extracting and correlating the information is quite difficult and the possibility for errors is large. All parties involved in the spectrum reallocation process would be better served if an official engineering database were provided.

Respectfully submitted,

Shared Spectrum Company

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